Conditions at the Pure/Applied Boundary

Pure vs. applied mathematics—is it a helpful distinction? Are these different fields, and do they need to be separate to flourish?

They have certainly separated to some degree. We have AMS and SIAM, LMS and IMA, DMV and GAMM, CMS and CSIAM, MSJ and JSIAM. (If you know all these abbreviations without looking them up, you are a math society geek; please go to www.siam.org and volunteer to serve on a SIAM committee!)

We all know the stereotypes. Pure mathematicians are brilliant but clueless. Applied mathematicians don't care if something is true so long as it

FROM THE SIAM PRESIDENT
By Nick Trefethen

works. But quite apart from all that is the day-to-day fact that most of us spend most of our time among just one set of people or the other. At a university, applied mathematics may be in a separate building, or on its own floor in a big department more unified in name than reality. In industry . . . well, it may be hard to find a pure mathematician at all.

We have all thought about the pure vs. applied question at a personal level. Following a kind of relativity principle, many of us seem to perceive our own activities as lying at a sensible midpoint of the spectrum, with equal expanses of more applied work stretching off in one direction and purer work in the other.

Here are some views. Do you share them?

There is beauty in a great theorem that nothing else can match.

Much of what applied mathematicians produce is forgotten ten years later.

Most of the really top people go into pure mathematics.

And how about these?

Most pure mathematicians know little science and even less engineering.

They don't care about phenomena, just technique.

The gods of pure math may do great things, but the mortals are wasting their time.

I've been asking colleagues recently what they think. What I hear over and over is that the separation of pure and applied is a bad thing. "Mathematics is all one." "There should be no boundaries." "The distinction is obsolete." "It shouldn't be there." One friend writes of "the ridiculousness of the boundaries between 'pure' and 'applied'."

Many of us seem to feel that as researchers, we should strive to tear down an invidious distinction, and as educators, we should strive to bring the pure and applied curriculums closer together. There is a sincere worry that even the purest mathematics students need to learn more numerical analysis and mathematical modelling, and that even the most applied need more grounding in basic subjects like measure theory and functional analysis. Computer science too is recognized as a kindred subject about which students should be more knowledgeable. (Curiously, I hear less about statistics, which grew apart from the rest of mathematics longer ago.)

If not quite a consensus, this is at least a widespread view, and it is basically a gloomy one. While admitting that they tend to align themselves with one side or the other, individuals say that it shouldn't be this way, that something has gone wrong, that if only we tried a little harder, individually and collectively, mathematics could be stronger.

I think we need not be so gloomy. Yes, it would be marvelous if mathematics were all one, but science keeps growing and mathematics is everywhere and that is marvelous too. As knowledge accumulates on a thousand fronts, new fields take shape, and we're not going to reverse this process. Some rivalry between groups is natural, and I think our job is to make sure it's a rivalry, not a fight. Maybe our model should be sports teams like the Red Sox and the Yankees. Or maybe pure and applied mathematics are like classical music and rock and roll. Elton John and Maurizio Pollini are probably not regular drinking buddies, but when you come down to it, they're both colleagues in the piano business.